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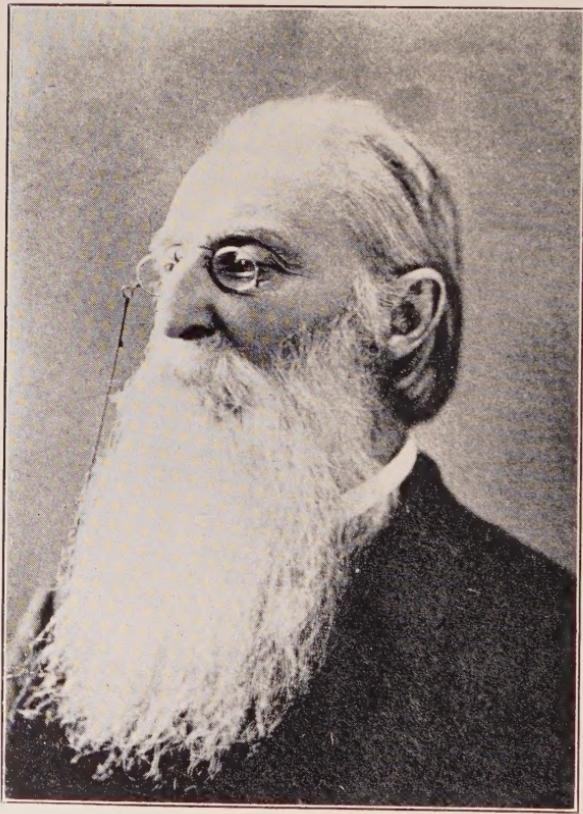
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Yours sincerely
A. Gurnell.

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DR. AARON YOUNG, JR. AND THE BOTANICAL SURVEY
OF MAINE

ARTHUR H. NORTON

(With Portrait)

ON THE third day of July, 1847, John W. Dana, Governor of Maine approved a resolve appropriating the sum of six hundred dollars for a botanical survey of the State. Somewhat after midsummer the same year, Dr. Aaron Young Jr.,¹ was appointed State Botanist to carry out the provisions of the resolve.

The report filed with the Governor by the State Botanist was not published as a State document, a matter contributing to the cloud of obscurity which has long enshrouded this transaction.

Dr. Young and the persons whom he associated with himself in the field work of the survey appear to have been among the first to explore the whole length of Mount Katahdin from the north end to Monument Peak, and first to publish accounts of their observations, the first to show definitely that the summit of the mountain harbored an extensive true alpine flora, the first to make a representative collection of the commoner plants of that flora² and the first to apply dis-

¹ At a meeting of the Maine Historical Society on February 27, 1913, Dr. James At Spalding, biographer of the Maine Medical Association, read a biographical account of "Dr. Aaron Young Jr., Maine's first Botanist." A note from Dr. Spalding to the present writer January 13, 1913 gives the following analysis of that article. "My plan is a life [of Aaron Young] with intercurrent notices of his medical services. I shall not expand on Ktaadn or on anything botanical, but leave that to you." The writer of this paper would gratefully acknowledge the wise advice and the help of Dr. Spalding in bringing to light the facts connected with the subject here presented. Dr. Spalding's manuscript in the archives of the Maine Historical Society has not yet been published.

² In August 1845 Dr. Edward Everett Hale and Wm. Francis Channing made an excursion to Katahdin by way of the North end; they ascended by Katahdin Stream,

tinctive names to several of the prominent features of Katahdin. Also he was the first to attempt a comprehensive collection of the marine algae of the State of Maine, and the first to survey the hard-wood forests of York County.¹

Aaron Young, Jr., was born in Wiscasset, Maine, December 19, 1819, the son of Aaron and Mary Colburn Young. Aaron Young, Sr., was the son of David Young, a pioneer of Pittston, Maine, and Mary Colburn Young, mother of Aaron, Jr., was the daughter of Oliver Colburn, son of Captain Reuben Colburn, who furnished batteaux for Arnold's expedition to Quebec. Aaron Young Sr., was Justice of the Peace and Coroner 1821-1823 at Wiscasset, and held the title of Justice of the Peace at Bangor for a number of years subsequent to 1829, and for a longer time that of Surveyor of Lumber at the important port of Bangor, then the metropolis of the lumber industry in Maine.

Aaron Young, Jr., was schooled at Gorham Academy and Teacher's Seminary. This was followed by two years at Bowdoin College and finally attendance at Jefferson Medical School in Philadelphia, where "he was graduated in medicine." At Bowdoin College, he was so deeply devoted to the sciences of botany, mineralogy and chemistry, that Professor Parker Cleaveland made him Assistant in Chemistry.

By his own statement it appears that he spent two years teaching at Paris, Maine, "part of the time associated with our friend, and part of the time as Principal. We did all we could to keep the institution alive and think our interest was deeply appreciated. The Aesthetic assemblies established by ourself were the scholars pastime, instructive and amusing. We hope they are now continued. We wish our friend and the institution all sorts of success." (1854 "Diarium" in Touchstone, May 24).

While a student at Gorham he was very active in a natural history society in that town, which has long been forgotten. In 1839 and 1840 he was Secretary of the Bangor Natural History Society, which many years ago shared the fate of that at Gorham. Yet the Bangor

a little further to the south than the route taken by Dr. Young, thus avoiding the ascent of Mount Russell. Reaching the summit, they became enveloped in clouds with rain and were assailed by a heavy wind. They reached only the southern end of the North Mountain. Dr. Hale gathered about 20 species of plants in series of 20 each for Dr. Gray. (Boston Daily Advertiser Aug. 15, 1845; revised 1901, Appalachia IX (iii-iv) 277-289).

¹ Dr. George B. Emerson, born in Kennebunk, Maine, in his "Trees and Shrubs of Massachusetts" had mentioned a number of the rarer species found in York County. Dr. Young was familiar with Emerson's work and probably was inspired by it to make his prolonged "survey" in this region.

Society appears to have been the medium which held his attention and led up to the shaping of the Botanical Survey.

The duties of the secretary of the latter brought him into correspondence with Dr. Ezekiel Holmes,¹ who seems to have become his valued advisor.

Replying to a letter from Dr. Young of February 6, 1839, Dr. Holmes wrote as follows:

Augusta (H. R.) Feb. 14, 1839.

Mr. Aaron Young

Secretary of the Bangor Nat. History Society.

Dear Sir

Yours of the 6th., was duly received, informing me that I have been elected an Honorary member of your Society.

Allow me, Sir, through you to express my sense of gratitude to your Society for the honor conferred upon me by them. The study of Natural History is the learning the laws of nature as laid down by Omnipotence Himself & the application of the facts discovered by the scouts have contributed largely to the civilization of man & the amelioration of society.

You have begun well, let your labors be known to the world. Allow me to suggest that you lay out some ground work & by means of the press, let your light shine out among the people of the State. If you feel modest suppose you confine yourselves to the city of Bangor and vicinity & next summer publish a Flora of Bangor.

It is very probable that you will find nothing new—but what has been found and described many times before—What then? Would not a work emanating from your Society, containing accurate but familiar descriptions of the plants to be found at your doors, and around your fields & put into the hands of your children & young people stimulate them to the study of Botany much more than a large volume containing concise & technical descriptions of plants of North America? Perhaps I am intruding by offering suggestions unasked. Excuse me and accept my best wishes for the success of your Society.

Very respectfully yours,
E. Holmes.

Four years later, 1843, while domiciled in Bangor and a member of the firm of McRuer and Young, Druggists, Aaron ventured upon the publication, in the Bangor Daily Whig and Courier, of a work bearing the title suggested by Dr. Holmes.

The Flora of Bangor; a description of the plants of Bangor and vicinity, with their generic and specific characters, places of growth and time of flowering. By Aaron Young, Jr.

The copy seen had been clipped from the columns of the Whig and Courier and pasted on sheets of octavo size. Neither the sheets nor the species were numbered, hence it is not entirely certain that none

¹ Dr. Holmes was born in Kingston, Massachusetts, August 24, 1801. A biography, with portrait of Dr. Holmes, was published by Dr. N. T. True in the Tenth Annual Report of the Secretary of the Maine Board of Agriculture, 1865, 207–226.

have been lost, but starting with the Ranunculaceae and closing with the Equisetaceae it would seem to be complete as far as published.

Eighty-seven species are treated. The paper contains an introduction, exhorting the reader to the study of botany, and rather extended directions for the collection and preservation of specimens.

The author states, "It will not be presumed that I shall confine myself strictly to the environs of our City, but on the contrary shall open the whole field of Maine as far as my observations have extended and the assistance of others in increasing my *hortus siccus*."

As an example of the taxonomic treatment and geographical scope of the paper, we present his account of the three leaved cinquefoil, then considered rare outside of alpine regions, and unknown to the author from the vicinity of Bangor.

POTENTILLA TRIDENTATA Ait. *Mountain Cinquefoil*. This is an abundant plant on the plains of Brunswick, particularly in the College yard and I believe has not been found anywhere else¹ in our state, except on Mountain tracts. Stems three to six inches high, prostrate, irregular, crooked and somewhat woody at base; stipules subulate at top below the leaves, leaves ternate-palmate; leaflets obovate-wedge-form, leathery, three toothed at the summit, pubescent beneath. Flowers white, in a sort of corymb, loose few-flowered; petals, oblong-obovate, longer than the calyx. June and July.

The paper contains an extended and original account of the colony of *Rhododendron maximum* at Standish,² which by a slip of the pen is located at the northern rather than the southern end of Sebago Lake. The most important feature of the document is the report of the colony of *Kalmia latifolia* at Cherryfield³ here brought to attention evidently for the first time.

The die had been cast, and Aaron submitted his "Specimen sheets" to his advisor, Dr. Holmes, who was hardly less ambitious than himself and fully as generous in respect to geographical limits. Dr. Holmes wrote very encouragingly in reply, and having been asked for suggestions gave the advice which seems to have been rather closely followed in carrying out the field work of the Botanical survey.

"Senate Chamber March 22, 1845.

A. Young, Esq.

Your letter of 25th., Feb. & the specimen sheet of "Plants of Bangor" have at length reached me. They were misdirected. I reside in Winthrop but am stopping this winter with the "servants" of the dear people.

¹ Cf. 1837, J. W. Bailey, Am. Journ. Sci., XXXII, p. 30. "Found it within a few yards of the ocean at the observatory in Portland."

² This station seems first to have been mentioned in print by Jacob Bigelow, 1820, Medical Botany, III, 402, 403. It had been brought to his attention by "Dr. Eaton."

³ See 1913, RHODORA 15, 142; 1931, RHODORA 33, 198-199.

I am very happy to learn that you have spent so much time, so SUCCESSFULLY in the Botanical researches suggested and I am happy to receive an evidence of your industry in the specimen sheets forwarded.

You ask my advice in regard to the work. I hardly know what to say to you, I would however respectfully suggest that if you make up your mind to describe the plants of Maine it would be advisable to change the title to that of "Flora of Maine" and the Flora of Maine when completed may rightfully comprehend the plants of Canada and the Province of New Brunswick and Nova Scotia as well as the Alpine plants of New Hampshire.

If you could spend a summer or a portion of a summer in exploring the St. John River and its tributaries from mouth to source, you would find many specimens not found in your neighborhood and they would be a fair sample of the New Brunswick plants.

The White Hills run over into Maine and to my certain knowledge the spurs of these mountains in Maine produce all the plants found in New Hampshire, so you can avail yourself of all the descriptions of those plants which you can find.

You will then want to have an exploration of our sea coast and islands which would consume another, or what would be the same thing, the labor of some one during the summer. I do not know whether our coast has ever had a Botanical survey. William Allen, D.D. late President of Bowdoin College paid a good deal of attention to our marine plants near Brunswick. He now lives in North Hampton, Mass., and I presume will give you a list of what plants he has found there.

Prof. Keeley of Waterville College will give you a list of plants in his neighborhood which he has explored pretty well. Dr. Scammon of Hallowell will probably give you a list of plants found in his neighborhood.

Perhaps you will ask me why cannot you furnish me some list? Alas I have spent heretofore, much time studying the Natural History of Maine with the view of publishing a general work on the subject while at Gardiner Lyceum; the story needn't be told; but I will merely say that in trying to do my duty to the Institution I fell largely in debt and my cabinet (by the liberality of the Trustees) which cost me more than a thousand dollars and several years of the best part of my life, was wrested from me and what now remains is at the Lyceum yet.¹ Let it go, I had to look out for bread for myself and family and let the Science of Nat. Hist. of Maine take care of itself. Were it not for this I could assist you, as it is I can only wish you God speed and will endeavor to help you by any views or suggestions which may occur to me.

I like your plan of the work, would put in such short facts as regards the medicinal and common uses to which the plants are put.

Please command me in anything that I can serve you and may plenary success attend your labors.

Cordially yours, E. Holmes.

Aaron Young was now determined to produce a "Flora of Maine," an ambition which he had long cherished and worked for, though he had restricted the title of his first paper in deference to the advice of Ezekiel Holmes. It would also seem, from other correspondence that

¹ The building which had housed the Lyceum, with its contents, was destroyed by fire in 1870.

he had for some time looked with hope to an exploration of Mount Katahdin.

In business Dr. Young was unstable, a fact shown to be true by the frequent changes he is known to have made. Under these conditions, the matter of financing his botanical work was an obstacle to his ambitions.

In 1847 he appealed to the legislature for an appropriation for a Botanical Survey of the State. He was most fortunate in being on the most friendly terms with Elijah L. Hamlin and other influential members of the legislature.

Mr. Hamlin presented in the House the memorial and resolve asking for \$600 for the purpose, though he realized, and informed Aaron that "this is not enough" but all that he believed it possible to secure at that time. He was keenly interested in the measure, and every week from the time of introduction of the resolve, May 23d., to that of its final passage by the Senate, June 25th., he wrote Aaron reporting the progress and the prospects of the document. The measure had been referred to a committee of 13 from the House and 5 from the Senate, and at the close of two sittings it was given a unanimous favorable report. It was approved by Governor Dana, July 3, 1847.

Though the appropriation was small, the requirements placed upon the appointee were not correspondingly stinted.

Acts and Resolves Twenty-seventh Legislature.

Chapter 11. Resolve authorizing a botanical survey of the State.

Resolved, That the Governor with the advice and consent of the council is hereby authorized to employ some suitable person to make a botanical survey of the State.

Resolved, That the person who shall be employed to make said survey shall deposit a complete suit of specimens of the flora of the State properly preserved and prepared, and suitably, labeled and arranged, and deposit the same in the public buildings, as the property of the state, and such person shall furnish such duplicates of said specimens as the governor and council may direct to be disposed of by them as they shall think proper.

Resolved, That the sum of six hundred dollars be appropriated from the treasury, subject to the discretion of the governor and council to be expended by them in defraying the expense of said survey, upon such terms and conditions as they may think best, *provided*, that said survey can be finished for said sum.

(Approved July 3, 1847)

Mr. Hamlin had approached Dr. Ezekiel Holmes, among others, on the subject of the survey, before he had decided that there was a fair prospect for the passage of the resolve, and had found Dr. Holmes in its favor.

It would appear that Aaron had looked upon Dr. Holmes as a logical, or possible competitor for the appointment of State Botanist. This is shown by the following letter, as well as the fact that a real competitor lay in the offing.

Winthrop July 8, 1847.

Dr. Young.

My Dear Sir—

While at Augusta yesterday I recd. your letter of July 2d. & after I returned this morning I recd. yours of June 27 to the care of friend Hamlin. So the last was first this time. I am not a competitor against you & was greatly surprised that any body came forward to trip up your heels—but such is the way of the world, there is always somebody ready to plunge into the pool of public pap (if it is ever so little a one) after it has been stirred by the political angels. Never mind. I hope your bill succeeded in obtaining the mission & that you will find the top rock of Katahdin, coast down the St. John from source to mouth, and home by way of the islands & by the way stop right here. While I think of it & put down upon your list of plants *Subularia Aquatica*, Mr. Nuttall¹ gave me a specimen of this plant 24 years ago, which he had found in a pond in Waterford, Ox^d Co., in this State & told me that he had never seen it before except in some of the small lakes in the north of Europe.

I will do what I can for you in obtaining the appointment.

In much haste, yours &c.

Ezekiel Holmes.

Before the ink of the official signature was dry, Dr. George C. Swallow, then a teacher at Brunswick, had appeared in the halls of the legislature as a candidate for the appointment. This incident seems to have caused some excitement among the friends of Aaron Young. Mr. Hamlin was absent, but other loyal friends were present and advised Aaron to act promptly.

Augusta July 3^d 1847.

Dear Sir

Mr. Hamlin has no doubt informed you of the success of your petition by the passage of the resolve reported by the Committee.

By that resolve you are assured the Gov. & Council have authority to appoint whom they please to make the survey &c., as therein provided.

¹ In 1800 a post office was established at Waterford which became a mail distributing station, reached by a "post rider" on horseback from Portland; his route passed through Standish and Bridgton. He returned through Norway, Paris, Hebron, Poland, New Gloucester and Gray. In 1820 a four-horse coach or stage was put on the route. (Lapham. Hist. Paris. 266).

Another road, from the "White Mountains," through Conway entered Maine at Fryeburg and continued to Portland through Standish.

A letter from L. Willis to Mr. Elijah L. Hamlin, July 15, 1824, stated that Mr. Nuttall of Cambridge would visit Paris in a few weeks for the purpose of viewing Mount Mica where tourmaline had been discovered four years earlier. John Pedrick of Salem wrote Mr. Hamlin August 10, 1824, that Professor Nuttall had started for Franconia and Paris. (Hist Mount Mica, 19.)

It would seem that Mr. Nuttall had taken passage from Franconia to Standish, thence the stage to Waterford, remaining over night, which allowed time for exploration of the pond where he found *Subularia* before continuing on his journey to Paris.

I find a gentleman has arrived here today from *Brunswick* by the name of *Swallow*, who is making interest for the appointment, by getting recommendations from members to the Governor. He has recommendations from the President and Faculty of Bowdoin College and others.

What his claims are I know not save by his certificates. But as the resolve was passed on your petition, I thought it right you should know what was going on (if you haven't already been apprised of it) so that you might take measures to defeat the opposition of Mr. Swallow; and as Mr. Hamlin has gone to Paris to be absent till the middle of next week, I have taken this opportunity to give you the information above. I supposed it was your intention to visit Augusta soon. You will now perceive the propriety of not delaying it any longer.

You will deem it best, no doubt, to bring with you all the testimonials you can get of your qualifications for the appointment.

Mrs. Appleton & Elizabeth are here and send their best regards to Mrs. Young and yourself.

Very truly yrs
N. D. Appleton¹

Dr. A. Young Junr

This incident probably delayed the appointment of the State Botanist for several weeks. Dr. Young finally received the commission but not until the summer was well advanced.

The first steps for the execution of the survey followed quickly and on August 18, 1847, at nine A. M., a party consisting of seven persons left Bangor for an exploration of Mount Katahdin.

The party consisted of Dr. Aaron Young, Jr., in charge, aged 28 years; Dr. George Thurber of Providence, R. I., later noted as a botanist and horticultural editor, aged 26 years; Rev. Ariel Parrish Chute, a clergyman of Harrison, Maine, aged 38 years; Mr. J. K. Laski, later known as Dr. John De Laski, and a writer on the Glaciology of Penobscot Bay, then probably of Bangor, aged 32 years; John Emerson of Glenburn, Maine, a young man, George Emerson of Bangor, a youth, and James Cowan of Bangor, guide.

Dr. Young in his letter to the governor submitting his report on the survey says of the party, "In my exploration of Katahdin I was accompanied by Mr. George Thurber of Rhode Island and Messrs. Chute and Emerson of this State, gentlemen well skilled in botany, who rendered me very efficient service in my labors. Other gentlemen also volunteered their services, to whom I am indebted for the alacrity with which they entered upon their tasks."

Dr. Thurber in his private diary gives this view of the party.

¹ Nathan Dane Appleton, born in Ipswich, Mass., May 20, 1794, graduated from Bowdoin College, 1813. Practiced law at Standish, Maine from 1818 to 1820; and at Alfred from 1820 to 1861. State representative 1829, also 1847-1848. State Senator 1830. Attorney General of Maine 1857 to 1859. Died at Alfred, November 12, 1861

Dr. Y., I had never met before. He is very zealous in botany but lacks discretion, and was not entirely the man to have charge of such an expedition. Mr. Chute I was pleased to meet, a good naturalist and upon the whole an amiable man. Mr. Laski, who is a man of some literary pretensions, was rather too much out of his element to appear well, still he treated me with the utmost consideration. Mr. Cowan, our guide, a good-hearted rough fellow I got much attached to. He showed me every possible kindness. John Emerson, poor deaf and mute fellow, filled with the love of nature but every outlet to his joy closed, save his bright speaking eye, kind, patient, enduring John, I shall not soon forget you. And George Emerson, too, my little chum who always shared my blanket and my cup, who was always trying to do some kind thing, dear friend, I hope once again to see your kind smile.

The itinerary of the Katahdin expedition has been well told in the account published by Mr. Laski in the Bangor Courier early in September 1847, which has been reprinted in the *Maine Naturalist*, (1927, VII, 38–62), and by Dr. Thurber in the *Providence Journal* late in September 1847, also reprinted in the *Maine Naturalist*, (1926, VI, 134–151).

This expedition consumed two weeks, the party reaching Bangor on its return September first. Collecting was done along the way and on the mountain, which was explored from Mount Russell, its north-eastern spur, to Monument Peak.

Upon this peak Dr. Young bestowed the name of Pomola, but through the obscurity of his medium of publication his name was lost to view, and fourteen years later Dr. Charles H. Hitchcock bestowed the same name upon the eastern peak, which still bears that name.¹

For the North Mountain (so called), he used the name of Camel's Back, and he named the body of water now known as Chimney Pond, Norris Lake, in appreciation of the labors of Joseph Norris² who ran the monument line from the eastern boundary of the State to Mount Katahdin in 1825, and was probably the first to describe this pond.

The party collected a large number of the more conspicuous plants of the mountain, and many of these found resting places in the older

¹ Hitchcock, First Ann. Rept. Scient. Surv., in Sixth Ann. Rept. Sec. Maine Bd. Agric. 398. In his second annual report, 1862, he again refers to the subject expressing the erroneous belief that "by a strange coincidence the name Pomola was applied many years ago by Mr. Young, a botanist, to the same peak to which we thought it appropriate last year" (348).

² In 1825 Joseph C. Norris and son entered upon the task of surveying a base line for township surveys, due west across the State, from the head of the East Branch of the St. Croix River also known as Monument Brook, in the town of Amity. This line which crossed the northern end of Katahdin is commonly known as the "Monument Line."

Mr. Norris traversed the mountain for nearly its entire length. His journal was evidently carefully studied by Aaron Young, in the Land Agent's office. Norris's description of this pond was published by M. H. Avery, 1928, *Appalachia* XXI, 39.

herbaria of the eastern states, and many are mentioned by Dr. Young in his report. Dr. M. L. Fernald has summarized the known results of the expedition as follows. "Though they brought back the first representative collection of Katahdin plants, they apparently got none of the rarer species and the data upon their labels are unfortunately incomplete."¹

The second step towards the execution of the survey was taken September 28, when Dr. Young reached Castine and employed "Mr. Bridges" to assist him for several days.

Dr. Young had a wide circle of correspondents among the leading botanists of the period, among them Prof. William H. Harvey, the eminent Irish algologist. Prof. Harvey had encouraged him to dredge on the Maine coast for algae, believing from the rocky indented nature of the shores with their deep reaches, that it would prove one of the most fruitful regions on our Atlantic coast for these plants.

Aided by Mr. Bridges, he spent most of the time at Castine in dredging in water of varied depths. October 5 he embarked on the Revenue Cutter "Veto," Lieut. S. C. Foss commander, for a short cruise among the islands of East Penobscot and Jericho Bays. On the date mentioned they harbored in the lee of Big Deer Island, where Aaron again used the dredge. From this berth they sailed to Burnt Coat, now called Swan's Island, where they harbored one night. The dredge was used here, both in the harbor and in deeper water outside.

From Burnt Coat they sailed to Isle Au Haut Thoroughfare October 7, and Dr. Young, Lieut. Foss and the Pilot, Mr. Eaton, landed on Isle Au Haut and ascended "the mountain"; Aaron noticed alders, "low alder, (*alnus crispa*) not over two or three feet high, apparently distinct from the two species common in our low lands;" "*Oakesia*" [= *Corma*] "*Conradii, Kalmia latifolia*"² and a few common plants.

Returning that night to the Northwest Harbor of Great Deer Island, on the following morning they visited the serpentine quarry on the island, then giving promise of commercial importance. Aaron learned that on frequent occasion fires had raged, destroying the yellow birch woods on the island, formerly a valuable source of fuel to the settlers.

¹ 1901, Fernald, RHODORA, 3 166.

² Mr. N. T. Kidder, authority on the flora of Isle Au Haut, informs the writer, that this plant is not now known to occur on the island and raises the pertinent question of a possible mistake in identification of the species. Dr. Young seems to have been acquainted with the three species of *Kalmia* found in the State, having described them all in the Flora of Bangor in 1843. Considering the violent admiration given this showy plant both for floral and evergreen decorations, wherever it occurs in isolated colonies, it seems possible that a small colony existing in 1847 may have been extirpated.

He remarked that "*Ulmus fulva*" was a native tree of the island "but only two or three trees remain standing" and these cruelly stripped of their bark.

From this place he returned to Bangor and prepared for the final stage of his survey, an exploration of the hard-wood forests of York County. He states that he devoted three weeks to this section, and his diary closes on October 27, with an excursion to Kennebunk Beach for marine algae, which were washed ashore there in large quantities.

In February, 1848, he filed the report of his survey with the governor. This is largely in the nature of a diary of proceedings, divided by a series of chapters or headings, which show what he tried to accomplish. It was submitted as a preliminary report, with the evident hope that the survey would be continued by the next legislature. That body was unwilling or unable to make further appropriations for the purpose, and some of the legislators expressed disappointment at not having received an illustrated handbook of the flora of the state, as the result of the ten weeks' work by the State Botanist, so the matter was allowed to terminate.

Dr. Holmes, editor of the *Maine Farmer*, a weekly newspaper, appears once more upon the scene, now to rescue from complete oblivion the "Report of the Botanical Survey." This he published in his paper under the general title of "Dr. Young's Report." It appeared in eight instalments from March 16 to May 25, 1848; the eight issues bear the following sub-titles and dates of publication.

March	16:	[Letter of Transmittal]; Botanical Report of Mt. Katahdin.
April	13:	Botany of Mt. Katahdin (concluded).
	20:	Brief Account of Mt. Katahdin.
	27:	Exploration of the Coast and Islands.
May	4:	Forests of York County: Species of Oak.
	11:	Oak Planting.
	18:	Continued.
	25:	Concluded.

No instalment appeared between March 16 and April 13; both of these issues are devoted to the Botany of Mount Katahdin, wherein are mentioned forty-two alpine species, with others observed between the base of the mountain and Hunt's Farm on the East Branch of the Penobscot River. The fact that the white pine had been nearly all stripped off along the Wissataquoik previous to that time is noteworthy.

In his "Brief Account of Mt. Katahdin," April 20, Dr. Young reviews the principal facts concerning the ascents of Turner, 1804,

Bailey 1836, and Jackson, 1838, placing all possible emphasis on the scanty botanical notes contained in their published accounts, and gives a geographical description of the mountain, with reference to its satellites to the north and west. His description of the summit of the mountain from Mount Russell to Monument Peak is evidently the first to appear in print, excepting the more scattered notes of his associates, Laski and Thurber, published a few months earlier. In addition to the nomenclature proposed by Dr. Young, noted above, he coined the term "saxetum" for the rocky slopes of the peaks, a term for which the "alpine fell field"¹ of recent application seems more or less synonymous.

April 27, "The Coast and Islands," has been sufficiently noticed.
May 4, "Forests of York County, Species of Oaks,"

enumerates eight species, which are distinguished as *Quercus alba*, *Q. bicolor*, *Q. montana*, *Q. ilicifolia*, *Q. rubra*, *Q. borealis*, *Q. coccinea*, *Q. tinctoria*, (= *velutina*), and *Q. chinquapina* (*prinoides*). The last from the foliage was at first considered to be young plants of *Quercus montana*, but finding it with mature acorns, combined with low shrubby habit, Dr. Young finally identified it as above. This he states, he found mingled with the bear oak "on arid sandy plains of Alfred." This species has not been found in Maine in recent years.

That Aaron Young had been a frequent visitor in Alfred previous to the time of his survey is indicated by a note in his "Diarium" appearing in the "Touchstone," October 11, 1854, when on passing through that town in his cart, "The Good Samaritan" he observed, "We were married here and never regretted it."

May 18. Though this instalment bears no title suggestive of its contents, the journal of field work is resumed giving accounts of the Chestnut, Butternut, Shagbark, the Hazels, *Rhododendron maximum* and *Kalmia latifolia*, both of which the author found in York County, (and again references are made to the occurrence of the latter at Cherryfield and at Isle Au Haut); of the Sassafras, Fever Bush (*Benzoin*) and *Stellaria aquatica* (= *S. uliginosa*) which Aaron was asked to examine at "a vale of springs" in Alfred where the plant grew with such luxuriance that it often choked the outlet of the stream from the springs and "defied extirpation."

May 25. Concluded. (excursion to Kennebunk Beach.)

In the report of this survey, as printed in the Maine Farmer, there are mentioned a total of ninety-seven plants, including three algae,

¹ 1919: Harshberger, Geogr. Rev. 7: 233.

two lichens and one moss. Young made no attempt to include the result of his dredging operations in the report, or to enumerate the non-vascular Cryptogams which he evidently collected on or near Katahdin. The chief emphasis of the report is placed on the survey of Mount Katahdin. Here he enumerates the vascular cryptogams, Coniferales, Graminales, Liliales, some other prominent herbaceous groups, and the woody plants of the mountains. On the coast he touched either upon the most conspicuous or the rarer species, few in number, and in York County almost entirely upon the trees and shrubs.

By March, 1848, he had prepared the first volume of a proposed Exsiccatae of the "Flora of Maine." One or more copies of this was exhibited at various cities, Portland, Boston and New York, and a copy seems to have been presented to Hon. Nathan Dane Appleton, yet no copy in the original¹ condition seems to be known in existence today.

The following abstract by Dr. Asa Gray² gives the most complete description of the title and nature of the work which we have discovered.

A Flora of Maine, illustrated with specimens from Nature, arranged according to the Natural System, and containing Descriptions of all the known Indigenous Plants Growing in the State, etc. by AARON YOUNG, JR. Bangor, 1848. Vol. I.

We have seen a specimen volume of this work, which Mr. Young who was recently appointed to make a botanical survey of the State of Maine, is engaged in publishing, "in so unique a manner." It is a large folio volume, very handsomely bound in cloth, and containing fair specimens of about forty plants of the state, each fastened to a sheet of thick paper, protected by a fly leaf, and accompanied by another leaf containing the name of the natural family to which the species belongs, its generic, specific, and popular names, a specific character, place of growth, time of flowering, and some descriptive or popular remarks. Mr. Young proposes to publish all the plants of his state in this manner, "in about twenty volumes" (which however, will not be sufficient for the purpose), and offers the whole to subscribers for \$100, or the volumes "of from five to ten decades each" at six dollars. No doubt there will be a ready demand for as many copies as he can prepare, "of the present magnificent size" and style; but how they can be afforded at this price is entirely beyond our comprehension. That it is not done at the expense of the State, but at the author's proper expense, is evident from the fact, that, the appropriation for conducting the botanical survey appears to be only two hundred dollars per annum for three years.

A. GR.

¹ Dr. M. L. Fernald informs the writer that there is a set in the Gray Herbarium which has been taken apart and the specimens distributed according to the classification of the Herbarium.

² 1848. Am. Journ. Sci. 2 s. V. 453.

He forwarded a copy to New York for the especial purpose of submitting it to Dr. John Torrey, as shown by the following letters.

Princeton March 17th 1848.

Dear Sir:

Your letter of February 25th reached me the first of March. As it was not mailed till the 26th inst., there was not time for an answer to reach you by the first of this month, (the time you wished me to reply) even had the letter come by express.

When it came however, I was busily engaged in my Chemical lectures and laboratory duties—besides examining students every evening.

I was also writing during the half hours that could be snatched from other duties, a Botanical Report to accompany Major Emory's narrative of the expedition across the Continent in which he acted as Top. Engineer. You see then how nearly impossible it was that I could write to you.

The illustrated Flora of Maine which you have undertaken will be a work of great labor but (if properly executed which I have no doubt will be the case) the value of it will repay all cost. In many respects such a work though the number of copies is very limited will do more good than even a printed volume of Descriptive Botany for it will at once settle the nomenclature of any plant of your State that it includes. If copies were deposited in the principal towns of Maine where they could be referred to by persons who are studying native plants there never could be any difficulty with the Botanical and popular names of your plants. The price seems to be far too little for the work even if the style of it is of the plainest kind, but I suppose you can do such things cheaper in Maine than they can be done in New York. If you have an opportunity of sending a volume to New York and will direct it to be left at Dr. James Chelton's in Chambers St., I will examine it and report if you please to the Governor.

Yours truly,

John Torrey.

Princeton New Jersey March 31st 1848.

Dear Sir.

Your favor of the 22nd is received and yesterday I had the pleasure of examining your beautiful volume, sent to me through Mr. Chelton.

I hardly see how it is possible for you to get out the work at so low a price. If you can have the actual cost it will be all you can expect. Pray what is the cost of binding such a volume in Maine, supposing 100 copies be done at once?

I have admired your paper as just the thing for an herbarium. It is difficult for me to get any here. I need some now for my own herb. The size of my paper is only (when folded) 15 x 11 inches.

Will you have the goodness to enquire, whether any of the paper manufacturers around you have a white that will cut, without much waste of that size. The color, thickness & stock as much like yours as may be. Or if they have it not, how small a quantity of it they will make to order and the price. It ought to weigh about 45 or 50 lbs., to the ream.

The State of New Jersey is a poor place for science. I doubt much if any subscriber could be got in it for your work, or even for one much nearer home. In our town (I mean Princeton although I don't consider myself a Jerseyman) there is but one person who has a taste for botany besides myself. It is probable that if your specimen volume were left at some

literary emporium in New York some person would see it who would like to secure sets of the work. If you are willing to trust it I will have it deposited at Wiley's (of the late firm of Wiley and Putnam) and instruct a neighbor of mine who is in the store to show it where there may be a chance of its being appreciated.

I enclose a note to Governor Dana which may meet your views.

Yours truly

John Torrey.

You can read the letter to the Governor then seal and deliver it. Did you notice a little error in your title page, synonymon for synonyms?

With the termination of the Botanical Survey, which he plainly aspired to finish, and the lack of subscribers to the Flora of Maine, Dr. Young appears to have abandoned the field of botany. He was not embittered by the collapse of his hopes, but his active mind turned to other channels of thought, and other experiments at making a living in which the popular response was more in the nature of "The show which wayside folk admire."

He moved to Lewiston and again engaged in the drug business. Here he began the publication of several newspapers: "The Pansophist" 1852, which continued a year or less, followed by the "Touchstone" 1853 and 1854; the same year, 1854, the Farmer and Mechanic, of short life, which seems to have closed with six numbers.¹

In the Touchstone he conducted a department called "Diarium," a section teeming with short notes, many of them now of historical interest. In the "Diarium" of May 18, 1854, he says "We don't print a paper for any other purpose but to let our minds have a vent." This may be regarded as a fair commentary on his life motives, the finding of an outlet for continual action for action's sake.

He soon offered his drug interest for sale, and appeared at Farmington, where he edited the "The Franklin Journal of Aural Surgery and Rational Medicine," 1859, another journal of short life. In the first issue, of January 15, 1859, there appears under his authorship a very fine obituary of Professor Parker Cleaveland.

Before leaving Lewiston he abandoned the confinement of the "Store" and launched upon the road in a spectacular peddler's cart, decorated by a Good Samaritan in the act of healing, in which he travelled all over the southwestern section of the State selling "Young's Cathalicon," a cough syrup reputed a great remedy for human ills. He interested himself in civic matters, public health, the cause of the striking mill-girls whom he believed to be justly aggrieved, and the

¹ Files of the several papers published by Dr. Young have been obtained by Dr. James A. Spalding and deposited in Bowdoin College Library

cause of abolition. Indeed, like his brother Joshua Young, D.D. (ostracised from his church at Burlington, Vermont, for officiating at John Brown's funeral¹), Aaron became too vociferous on the subject of abolition for his own welfare, even in Maine, and found it advantageous to move to New Brunswick.

With the outbreak of the civil war, his friend Hannibal Hamlin secured for him a consulate at Rio Grande do Sul, Brazil, which he held under Presidents Lincoln, Johnson and Grant. There Aaron Young found a large field of usefulness suited to his temperament, spending his time and even money in attending the suffering and needs of the hosts of refugees from the Southern States, in attempting to induce development of the natural resources of the country, in laboring for the improvement of the river and harbor at that port, and collecting a wealth of material for the Smithsonian Institution.²

SOCIETY OF NATURAL HISTORY,
Portland, Maine.

A PRE-KANSAN RECORD OF *PICEA CANADENSIS*
FROM MISSOURI³

ETHEL B. HANSEN

Plate 323

A PIECE of wood obtained from a coal mine in Macon County, Missouri, has added a new species to the interglacial flora of that state.

Preglacial erosion, especially in the territory bordering the Middle Fork in Macon County, Missouri, cut down in places sufficiently far to remove even the Bevier bed of coal. Clays, containing pebbles and overlain by drift varying in thickness up to 100 feet, now occupy the coal horizons (6). A diagram of shaft No. 24 of the Central Coal and Coke Company in Macon County is shown in FIG. 1. The strata, including the Bevier coal seam, have been cut through by preglacial erosion to a hard limestone below. At a point marked "X" the wood under consideration was found. This wood covered by Kansan till and occupying the place where the Bevier seam formerly was, is believed to be pre-Kansan or Aftonian in age.

¹ 1903: Crawford, Romance of Old New England Churches, Boston, L. C. Dodge & Co. p. 322.

² See Commercial Relations of the U. S. for 1864, 1866 and 1871.

³ Papers from the Department of Botany and Herbarium of the University of Michigan No. 425.

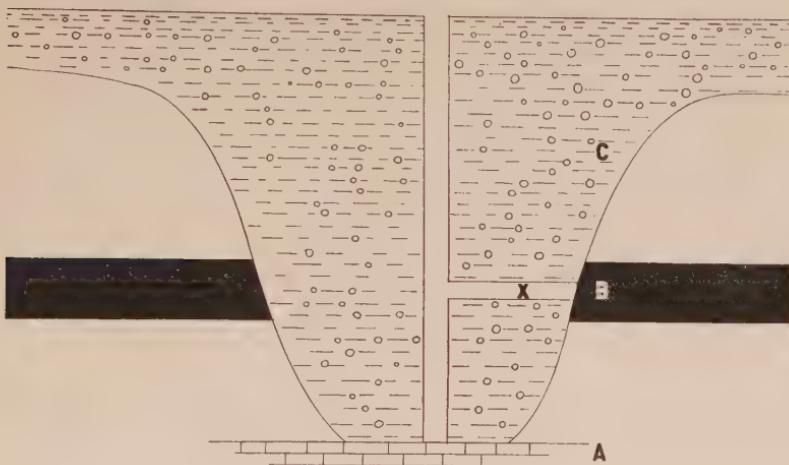


FIG. 1. Shaft No. 24, Central Coal & Coke Co.

The correct identification of fossil wood is attended with much difficulty due to the fact that not only color, odor, and the bark are usually missing but the cells are often badly crushed and fungal hyphae, spores, and mineral deposits obscure diagnostic features. After a careful microscopic examination of the wood (PLATE I), and comparison with known species, it was identified as *Picea canadensis* (Mill.) BSP. This species, has been found previously in the Pleistocene at Scarborough Heights, Ontario, Canada (9), and at Bloomington, Illinois (5).

In Missouri, Aftonian deposits have furnished fresh-water shells and the remains of mammals but the data concerning plant fossils have been very deficient. Broadhead (3) as early as 1870 reported sticks of wood found at a depth of 75 feet, and part of a grape vine at 40 feet in northern Missouri.

The same author (4) reported wood found in Daviess County; a grape vine and elm stick at a depth of 35 feet, a walnut log at a depth of 40 feet, and a pine log 6 feet in diameter at 70 feet. McGee (8) mentioned a forest bed 9 feet in thickness and 120 feet beneath the surface of the ground in Harrison County.

Baker (2) after making a careful study of the flora and fauna of the Aftonian period believes that there is evidence for a succession of two climates, (a) a warm, moist, temperate climate which favored luxuriant forests and such animals as the horse, elephant, and peccary and (b) a cold temperate climate in which a boreal flora flourished. Low-

lands and uplands, as today, furnished different habitats for plants and animals.

It is indeed fortunate that a single specimen of wood found in a coal mine has proved to be a species of definite climatic significance. The trees, shrubs, and herbs which were associated with *Picea canadensis* in making up the flora of the pre-Kansan period are as yet unknown. However, it is hoped that an opportunity may be presented for systematic collecting by a trained botanist at the site of an excavation or the sinking of a mine shaft which exposes a forest bed or fossil material. A collection made in such an exposure may give the investigator access to a whole florula.

Since *Picea canadensis* is limited in its southern extent by dryness and heat, it probably grew only during the period of boreal climate in northern Missouri. Its range extending as it does from Labrador northwestward nearly to the Arctic Sea is distinctly boreal. Its southern limits are southern Maine, northern New Hampshire, New York, shores of Saginaw Bay in Michigan, northern Wisconsin, and Minnesota (10).

It is interesting to note that the seedlings of *Picea canadensis* are light-tolerant and therefore pioneers in contrast to the shade-tolerant seedlings of climax forest trees (7). This spruce, limited in its southern extension by temperature, may have been an outlier on the frontier of the forest before the invading Kansan ice sheet.

SUMMARY

Picea canadensis (Mill.) BSP. has been found in northern Missouri and is considered to be pre-Kansan or Aftonian in age.

The presence of this species definitely indicates a boreal climate during part of the Aftonian interglacial period.

Acknowledgements are due to Wm. Harkes, General Superintendent of the Central Coal and Coke Company, Kansas City, Missouri, for sending the specimen of wood with data and a sketch of their mine shaft, and also to Dr. Frank Leverett, Dr. H. H. Buehler, and Professor E. B. Branson for their opinions as to the age of the wood.

UNIVERSITY OF MICHIGAN.

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EXPLANATION OF PLATE 323

Transverse section of *Picea canadensis* found in coal mine in Macon County, Missouri, $\times 150$.

BETTER HERBARIUM SPECIMENS.—Prof. J. Franklin Collins' article¹ under this title, advocating the use of sheets of sponge rubber as cushions in the plant press to equalize pressure and secure well-dried leaves and flowers borne on thick branches and stems or in close proximity to large fruits, calls to mind a very simple practice I have followed for several years which seems to offer certain advantages over the use of sponge rubber. It consists merely in inserting in each folder of such specimens, as the plants are put into the press, sheets of newspaper folded into appropriate shape and thickness and placed on the parts of the specimen that require special attention. These folded pieces of paper do not need even to approximate in thickness the thickness of the fruit or branch next which they are placed; two or three folds of paper are almost always sufficient, the flexibility of the drier sufficing to equalize the pressure; and they do not interfere at all with the proper drying of the specimen. They also assist in drying without contact, discoloration or deformation large folded fern fronds or leaves which overlap when the specimen is placed in its folder. A single piece or sheet of newspaper inside the folder is also helpful in keeping smooth compound leaves or delicate ones which tend to shrivel or inroll on the edges in drying. The principal advantages of this method are its entire freedom from expense and its greater adaptability to the requirements of individual specimens.—S. F. BLAKE, Bureau of Plant Industry, Washington, D. C.

¹ RHODORA **34**: 247–249. 1932.

A POST-WISCONSIN RECORD OF *FRAXINUS NIGRA*¹

GLADYS F. WEST

Plate 324

THIS paper adds *Fraxinus nigra* Marsh. to the immediately post glacial fossil flora of New York.

The specimen under consideration was collected by Dr. Frank Leverett in Oak Orchard Swamp, Orleans County, New York, in 1893. It represents a piece of a log which was found buried under about three feet of muck. A number of other logs were found in the same place but, since they all appeared to be alike, a sample was taken from only one. The swamp lies in low places between gravelly ridges and knolls and rests upon Wisconsin till (5).

The development of the swamp deposit began at the time of the draining of Glacial Lake Lundy (Glacial Lake Dana, 3), which resulted in the inauguration of Glacial Lake Iroquois in the Ontario basin, and the establishment of Lake Erie (6).

A remnant of the Lake Lundy waters remained for a long time in the Tonawanda Creek basin in northwestern New York which became Lake Tonawanda. It was a long, narrow, shallow lake which extended from the western side of Niagara Falls, eastward through Niagara and Orleans counties for a distance of about fifty miles. The floor of the eastern end of old Lake Tonawanda in Orleans County is now Oak Orchard Swamp (4, pp. 136-144). The fossil logs can reasonably be said to have grown sometime during the life of Glacial Lake Iroquois. They represent the remains of trees which probably grew along the margin of Lake Tonawanda and either fell in or were washed in at the time of a flood. Later, changing drainage conditions caused the disappearance of the waters of this lake and the development of a swamp in its eastern end, which is now occupied by a dense growth of tamarack.

The wood, although soft and very light in weight, was found to be in an excellent state of preservation. After a careful comparison of the fossil wood with wood of all the American species of the genus, and reference to published descriptions (8), it has been identified as *Fraxinus nigra* Marsh., black ash (PL. 0, FIGS. 1-4).

Only a few instances of the occurrence of ash have been reported in

¹ Papers from the Department of Botany and Herbarium of the University of Michigan No. 432.

the Pleistocene of this country. Fossil leaves of black ash have been reported by Penhallow (7) in the interglacial deposits of the Don Valley in Ontario.

The present range of black ash, according to Sargent (9), is from southern Newfoundland and the northern shores of the Gulf of St. Lawrence westward to Lake Winnipeg in Canada, and southward to New Castle County in Delaware, the mountains of West Virginia; westward to Knox County in southwestern Indiana where he considered its presence doubtful now; central Iowa, central Missouri and northwestern Arkansas. According to Deam (2), however, black ash occurs locally throughout nearly all of Indiana and in the southern part it is found sparingly in cypress swamps. In New York it is found in the lower regions in wet woods on bottomlands or along sluggish streams; at higher altitudes it grows along cold mountain streams and in deep, poorly drained swamps (1).

Little climatic significance can be attached to the presence of black ash in this particular instance except to say that the climate was probably similar to that of its northernmost limits today or, perhaps, even cooler due to the close proximity of the ice front. In the early stages of Lakes Iroquois and Tonawanda, the ice front probably stood a little north of the Carlton moraine in New York (4, pp. 134; 136), whence it gradually retreated northeastward out of the Ontario basin (6, Pl. 21), until by the close of Iroquois time it spanned the St. Lawrence Valley at a point below Kingston, Ontario (4, p. 144).

It is quite true that a great deal of climatic significance cannot always be attached to the presence of a single species, but the assembling of scattered records of the occurrence of only one or a few fossils may make possible the reconstruction of past floras of certain areas and the determination of the dominant components of those floras, from which certain conclusions may be drawn as to the climatic conditions which prevailed.

SUMMARY

Wood identified as *Fraxinus nigra* Marsh., black ash, has been found in New York in a post-Wisconsin deposit which dates to a period after the inauguration of Glacial Lakes Iroquois and Tonawanda.

I wish to thank Dr. Frank Leverett for the fossil specimen and the data concerning it, and Dr. H. P. Brown of the New York State College of Forestry for woods of *Fraxinus*.

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EXPLANATION OF PLATE 324

FIG. 1. *FRAXINUS NIGRA*. Transverse section $\times 45$, showing arrangement and distribution of vessels in early and late wood, narrow rays and terminal wood parenchyma.

FIG. 2. *FRAXINUS NIGRA*. Radial section $\times 100$, showing margin of a growth ring, wood fibers, vessel segments, terminal pore in a late vessel, vasicentric and terminal wood parenchyma.

FIG. 3. *FRAXINUS NIGRA*. Tangential section $\times 100$, showing vessel segments, wood fibers, vasicentric wood parenchyma, and distribution of rays in late wood.

FIG. 4. *FRAXINUS NIGRA*. Tangential section $\times 200$, showing pitted vessel segments of early wood.

NOTES ON THE DESMID FLORA OF NEW ENGLAND I.

THE GENUS *EUASTRUM* IN MASSACHUSETTS¹

GERALD W. PRESCOTT

Plate 325

THE genus *Euastrum* is a very interesting one for study, presenting as it does a number of taxonomic problems and a great variety of beautiful cells. The wall-markings in species of this genus, often very complex and elaborate, are helpful for identification purposes but to this end there is demanded critical discrimination on the part of the student. Because of the fact that these markings are easily obscured by density of cell-content, they are frequently overlooked. The failure to give sufficient attention to these often specific wall-characters leads to erroneous determinations, inadequate descriptions and, too

¹ Printed with aid to RHODORA from the National Academy of Sciences.

often, to incomplete and inaccurate figurings of these plants in literature. Hence, published figures, rather than being of assistance, are often misleading for purposes of identification, particularly to the beginning student. When an inaccurately executed published drawing is compared with the figure of the type or with a series of apparently faithful drawings the question naturally arises as to whether or not the worker had seen the form indicated or some other similar species.

It is the opinion of the author that one of the characteristics of the *Euastrum* cell has not received proper attention in both description of species and in drawings. This is the mucilage pore. The number and position of these pores are apparently specific and may be of assistance in making determinations. Too frequently the presence or absence of these pores is disregarded and, if present in the cell, are seldom shown in drawings.

It is the purpose of this paper to present certain notes and drawings for species of *Euastrum* in New England, which are new to the region or which, according to the writer's opinion, have been inadequately figured. Also plants are figured here which, so far as known, have never been illustrated in American literature, although they may have been reported and figured for this country in foreign journals.

The genus is well represented in New England habitats, there being some eighty species of a total of approximately one hundred forty varieties and species now known for North America. Our knowledge of the desmid flora of the region is largely the result of the works of Cushman (4-15), Harvey (17), (18), (19), Johnson (21), (22), W. and G. S. West (28-34), Hylander (20), and Wolle (35).

It is to be regretted that Cushman did not treat the genus *Euastrum* synoptically as he did some of the other desmid genera. The desmid literature is so very much scattered in this country (as in others, unfortunately) and the group so huge that the student of these plants must work under great handicaps. The possibility of having a monograph for this country similar to the work of the Wests in Great Britain is an achievement to be looked forward to. Such a monograph would of course be highly desirable because of the fact that the British Monograph is rapidly becoming insufficient, helpful and necessary as it is. It would seem that if such a work is ever to be accomplished in this country it must be done by contributions in the nature of generic monographs or synopses from various individuals. The lifetime of a single worker is scarcely long enough to permit the monographing of the entire group. Certainly Cushman made a start

in the direction of preparing synopses of the genera, at least for a restricted region.

The species dealt with in this paper are from collections made by the author on Cape Cod and adjacent islands during the summers of 1932 and 1933. From time to time it is hoped that he can add to knowledge of the algal flora for this very rich desmid region.

EUASTRUM Ehrenberg, 1832

EUASTRUM DIDELTA (Turp.) Ralfs. West and West, British Desmidiaceae II: 15, Pl. 35, f. 3-7.—Width 72.5 μ ; length 130.0 μ . PL. 325, f. 14.—Swamp near Falmouth.

This very common and widely distributed species has been adequately figured by Smith (26), Pl. 56, f. 2, except that the rather coarsely punctated character of the wall, an outstanding feature of the plant, is not shown. Other figures in American literature do not show the three large tubercles across the base of the semicell, the two just above the central tubercle with the mucilage pore between them, and the punctate wall.

EUASTRUM EVOLUTUM (Nordst.) W. and G. S. West var. GLAZIOVII (Boerg.) W. and G. S. West, Jour. Linn. Soc. London, Botany 33: 292. (*E. Glaziovii* Boerg. G. M. Smith, Wis. Geol. Nat. Hist. Surv. Bull. 57, Part II: 24, Pl. 56, f. 6).—Width 42.8 μ ; length 68.5 μ ; isthmus 11.0 μ . PL. 325, f. 21.—Swamp near Falmouth. Previously reported from Wisconsin.

Our specimens are slightly larger than recorded by Smith (26) for Wisconsin forms. Also there is a slight variation in the arrangement of the granules in face view. In the New England plants there is a pair of granules within the apical margin on either side of the median notch and one at either side of the apex of the median notch. This plant certainly seems to be related to *E. evolutum*, especially when regarded in relation to intergrading forms and the Wests had good reason for reducing *Glaziovii* to a variety of *evolutum*.

EUASTRUM HUMEROSUM Ralfs. West and West, British Desmidiae II: 8, Pl. 34, f. 1, 2.—Width 68.0 μ ; length 114.0 μ ; isthmus 16.0 μ . PL. 325, f. 2, 3; 11, 12.—Pond near Hyannis.

This large and elegant species shows considerable variation. In this locality the most conspicuous difference is in the depth and narrowness of the upper lateral incisions with the upper lateral lobes directed at a sharper angle than in the typical form. Also in the variant of the Cape Cod region the apical lobe is distinctly anvil-shaped (Pl. 325, f. 11) as in *E. pinnatum* and *E. tuddalense*. *E.*

humerosum in Sweden as figured by Borge has an apical lobe with parallel sides, presenting an entirely different aspect from the forms that are found on the Atlantic coastal plain and in Washington where the plant has been recorded by Moore and Moore (24). In New England this form has been previously reported by Harvey from Maine (18). Described as rare in Great Britain *E. humerosum* is widely distributed in the United States, although found but a few times. It is to be noted that all records at present indicate it to be a north temperate form, with habitats in northern Europe, the northern part of the United States and Canada, west to Washington. It has, however, been found in India (W. and G. S. West) and forma *scrobiculata* is reported from Florida (Borge) and Michigan (Prescott and Magnotta).

EUASTRUM INFORME (Borge) Emend. Borge, Arkiv. f. Bot. **19**: 23, Taf. 1, f. 9, 10.

This curiously-shaped species was described by Borge from Brazil. Its appearance in Massachusetts swamps is of particular interest as it has been reported from no other locality. Since Borge was unable to obtain an empty cell for complete description I take the liberty of emending his diagnosis. He states (l. c.) "Leider sind Diagnose und Figuren ein wenig unvollständig, weil ich keine leeren Zellen gesehen habe und also das Ausverhältnismassig grosse, abgerundete Endlappen gibt aber dem Pflanzchen ein von übrigen *Euastrum*-Arten so abweichendes Aussehen, dass ich es für richtig halte, die Form als neue Art aufzustellen."

Semicells with a large median, frequently bisected, tuberculation just above the isthmus, with a slightly smaller tuberculation on the face of each basal lobe; two small tubercles on the face of the apical lobe, one on either side within the apical margin; a large granule on either side of the median notch of the apical lobe; a small, blunt spine on the wall within the lateral incision of the semicell and a blunt spine about half way on the margin of the apical lobe; a blunt spine at the lower angle of the basal lobe; semicell in side view elongate-pyramidal with a distinct incision between the lower and apical portions, lower half of the semicell with a large truncate tuberculation on each lateral margin; upper half of semicell with a small tuberculation on either side and with a smaller granule on the wall about half way between the tuberculation and the blunt, conical protuberance at the apex; in vertical view elliptic, with broadly rounded poles furnished with a blunt spine and with a similar, smaller spine on either side of the poles; three prominent tubercles on the lateral margins. Length 41.8 μ ; width 19.0 μ ; isthmus 3.8 μ . PL. 00, F. 15-17.—Swamp near Hyannis.

EUASTRUM INSIGNE Hass. West and West, British Desmidaceae

II: 31, Pl. XXXVII, f. 2-5; Grönblad, Fauna et Flora Fenn. **49**: 17, Pl. 3, f. 35.—Width 56.7 μ ; length 105.6 μ . Pl. 325, f. 9, 10.—Elizabeth Islands; swamps near Hyannis.

This species is quite incorrectly figured by Wolle and since Wests give only an end view in their North American algae papers it is illustrated for a record from Massachusetts. The plant as it appears in my collections is identical with a form of Grönblad (l. c.) except that his plant is much larger (64.0 μ x 144.0 μ). In side view the specimens show a broader base of the semicell than figured by Wests, with distinct shoulders on the lateral margins at the base of a long neck.

EUASTRUM OBLONGUM (Grev.) Ralfs var. *CEPHALOPHORUM* West. West and West, British Desmidiaceae II: 14, Pl. 35, f. 1.—Width 73.0 μ ; length 151.0 μ . Zygospore 91.0 μ in diameter. Pl. 325, f. 1.

Only one specimen of this plant was seen, an empty semicell with a zygospore. It agrees in the essential characteristics with Wests' description of the variety (l. c.) but it is to be noted that the apical lobe of the Massachusetts plant is more like their figure of the typical form than the variety *cephalophorum*. The cell is somewhat smaller than given by Wests (90.0 μ x 155.0 μ). In this country it has been previously reported only from Michigan by Nichols and Ackley (25).

EUASTRUM PINGUE Elfv. West and West, British Desmidiaceae II: 30, Pl. 37, f. 1.—Width 39.0 μ ; length 57.0 μ ; isthmus 9.5 μ . Pl. 325, f. 18, 19.—Pond near Chatham. Previously reported from Me., N. J., and N. Y. (Also recorded for Newfoundland in MSS. of W. R. Taylor 27).

Except for Wolle's insufficient figures this seldom seen species has not been illustrated in American literature. The very large and eccentric pores (one showing in the face of each semicell) are distinctive of this plant.

EUASTRUM PULCHELLUM de Breb. var. *RETUSUM* West and West, British Desmidiaceae II: 47, Pl. LXIV, f. 17.—Width 24.0 μ ; length 36.0 μ ; isthmus 4.5 μ . Pl. 325, f. 13.—Swamps near Woods Hole; Elizabeth Islands.

Reported as rare in the British Isles, this species is fairly common and widely distributed in North America, having been reported from Mich., Conn., Miss., Wis., N. Y., and Canada.

In forms that the writer has seen from New England there appears to be considerable variation in the number and arrangement of granules as seen in front view. A common expression (figured herein) is one which has certain characteristics of var. *retusum* W. and G. S.

West but shows others that relate it to var. *subabruptum* Grönbl. This is particularly true for the three granules in oblique series on either side of the apical notch. The question arises as to the validity of these varieties in the light of intergrading expressions. Certainly *E. pulchellum* v. *retusum* as described by West seems a good variety. The figure of this variety in the manuscript of W. R. Taylor (27) however, shows a combination of characteristics of the typical form, var. *retusum* and var. *subabruptum*. The lateral spines below the apex of Taylor's specimen, if constant, are not typical for this variety, while the apical lobe, sharply set off from the basal lobes, is a character that belongs to the typical form and not to var. *retusum*. The linear arrangement of granules in Taylor's figure indicate the variation in disposition of these bodies. The figure of Hylander's (20) is not quite adequate to separate the plant from its varieties. The figure of G. M. Smith, Roosevelt Wild Life Bull. 2, Pl. 14, f. 2, appears to the writer to be not typical of this species. Certainly the emarginations of the lateral lobes are unusual and the relatively greater length of the cell gives a different aspect to his specimen.

EUASTRUM SINUOSUM Lenorm. var. **REDUCTUM** West and West, Jour. Linn. Soc. London, Bot. 33: 83; British Desmidiaceae II: 22, Pl. XXXVI, f. 2, 3.—Width 38.0 μ ; length 60.0 μ ; isthmus 10.5 μ ; thickness 27.0 μ . Pl. 325, f. 4.—Elizabeth Islands.

This plant has been reported previously from New England but has not been adequately figured in American literature. The figure of Hylander (20), who has the only New England record, does not show the definitely arranged mucous pores. In the specimens observed by the writer there is a pore in each of the five protuberances as seen in face view, as well as one showing in each of the protuberances on the lateral margins of the cell. In addition to these there is a straight row of four pores extending from the apex of the polar notch to the isthmus and a row of three just within the lateral margins as well as one on either side of the isthmus and just within the basal margin. The arrangement of the pores (exclusive of those in the protuberances) roughly describes a circle, with two pores arranged one above the other along a line bisecting the circle. Taylor in his manuscript (27) illustrates a form similar to the Massachusetts expression of this variety but the pores are arranged differently and there are none, apparently, in the protuberances.

EUASTRUM VALIDUM West and West, Trans. Linn. Soc. London, Botany 5: 245, Pl. 14, f. 32, 33; British Desmidiaceae II: 75, Pl. XL, f. 21, 22.—Width 19.5 μ ; length 27.0 μ ; isthmus 4.5 μ . Pl. 325, f. 20.

This small and rather plain species apparently has not been reported from this country since 1896 when it was described by the Wests. Taylor (27) has found it in Newfoundland and figures it in a forthcoming paper. The habitat in America is not given by Wests (l. c.) so that this is the first definite record for Massachusetts. It is noteworthy that the New England forms have the prominent median tubercle at the base of the semicell and just above the isthmus, a feature that is apparently absent in the Newfoundland specimens. The lack of this tubercle together with the absence of a central mucilage pore suggest that the Newfoundland plant figured by Taylor (27) is a variety of *E. validum*.

EUASTRUM WOLLEI Lag., Of. af Kongl. Vetensk.-Akad. Förhandl. **42**, No. 7: 233, Pl. 27, f. 6.—Width 101.7 μ ; length 155.0 μ ; isthmus 22.6 μ . Pl. 325, f. 7, 8.—Elizabeth Islands; pond near Chatham.

This very handsome species has been reported previously from New England by Cushman (9) who found it in N. H., but not figured. The var. *quadrigibberum* was reported by Lagerheim (23) from Tewksbury, Mass. Since published figures in American literature do not seem adequate to the writer the plant is figured herein. Rarely met with in the United States it was first described from New Jersey by Wolle as *E. intermedium* but renamed *Wollei* by Lagerheim (l. c.).

Besides the localities already mentioned it is reported by Taylor (27) from Newfoundland and by Brown (3) from Alabama. Brown's figures (Pl. 13, f. 31, 32) are very interesting but difficult to understand because of what appear to be inconsistencies. Her front view of the cell shows a lateral protuberance on either side and below the apical angles which is not typical of this species. However, in the side view of supposedly the same plant these protuberances are lacking, or, if represented, they appear as two of the apical angles, a correct view of the plant. This species has four distinct apical angles or lobules at the apex of the polar lobe, only two being visible in face view. Brown's figure 31 appears very much as this plant does when seen at an angle from vertical. It is difficult to correlate this possible view with the fact that both poles of the cell show this arrangement of the apical angles and it would be impossible of course to see the two ends of the cell at such an angle at one time. In Brown's description of the plant and in her figures and in the figure of Lagerheim the wall is described and interpreted as being granular. In all plants that the writer has seen the wall is distinctly not granulated. It is, however, very much thickened at the apices of the lobes and is deeply pitted.

The pits give a roughened appearance to the margin of the wall at the angles and show in concentric series on the tumors in front view. It is possible that there is a granular-walled variety of this species.

Additional species of *Euastrum* recorded for Massachusetts are as follows:

<i>EUASTRUM ABRUPTUM</i> Nordst.	<i>EUASTRUM GEMMATUM</i> de Breb.
<i>EUASTRUM AFFINE</i> Ralfs.	<i>EUASTRUM INERME</i> (Ralfs) Lund.
<i>EUASTRUM ANSATUM</i> Ralfs.	<i>EUASTRUM INTEGRUM</i> Wolle
<i>EUASTRUM BINALE</i> (Turp.) Ralfs.	<i>EUASTRUM MAGNIFICUM</i> Wolle
<i>EUASTRUM BINALE</i> f. <i>MINOR</i> West	<i>EUASTRUM OCCIDENTALE</i> W. and
<i>EUASTRUM COMPACTUM</i> Wolle var. MAJOR Lag.	G. S. West.
<i>EUASTRUM CRASSICOLLE</i> Lund.	<i>EUASTRUM PINNATUM</i> Ralfs.
<i>EUASTRUM ELEGANS</i> (de Breb.) Kuetz.	<i>EUASTRUM VENTRICOSUM</i> Lund.
<i>EUASTRUM EVERETTENSE</i> Wolle	<i>EUASTRUM VERRUCOSUM</i> (Ehr.)
<i>EUASTRUM FISSUM</i> W. and G. S. West.	Ralfs.
	<i>EUASTRUM VERRUCOSUM</i> var. ALATUM (Ehr.) Wolle.

Cole (Smith. Contrib. to Knowledge 2, Article 8, 1851) reported four species but his determinations are not acceptable. These are *E. rota*, *E. margaritiferum*, *E. pecten*, and *E. crux-melitensis*.

ALBION COLLEGE,

Albion, Michigan.

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EXPLANATION OF PLATE 325

FIG. 1. EUASTRUM OBLONGUM (Grev.) Ralfs var. CEPHALOPHORUM West ($\times 246$). FIGS. 2-3. EUASTRUM HUMEROSUM Ralfs ($\times 409$). FIGS. 4-6. EUASTRUM SINUOSUM Lenorm. var. REDUCTUM West ($\times 573$). FIGS. 7-8. EUASTRUM WOLLEI Lag. ($\times 352$). FIGS. 9-10. EUASTRUM INSIGNE Hass. ($\times 463$). FIGS. 11-12. EUASTRUM HUMEROSUM Ralfs. Forma ($\times 409$). FIG. 13. EUASTRUM PULCHELLUM Breb. var. RETUSUM West and West ($\times 594$). FIG. 14. EUASTRUM DIDEELTA (Turp.) Ralfs ($\times 315$). FIGS. 15-17. EUASTRUM INFORME (Borge) Emend. ($\times 778$). FIGS. 18-19. EUASTRUM PINGUE Elfv. ($\times 704$). FIG. 20. EUASTRUM VALIDUM West and West ($\times 737$). FIG. 21. EUASTRUM EVOLUTUM (Nordst.) West and West var. GLAZOVII (Boerg.) West and West ($\times 352$).

LITTORELLA AMERICANA IN QUEBEC.—I have been very much interested in the note of Dr. Muenscher of Cornell University concerning *Littorella americana* Fernald.¹

As stated in the note, the distribution of this member of the family *Plantaginaceae* is: Newfoundland, Nova Scotia, Ontario, Maine, Vermont, and Minnesota. We are glad to add Quebec to this list. Macoun's *Catalogue* recorded it (as *L. lacustris*) from the north end of Lake Champlain, collected by Pringle. Prof. Marie-Victorin of the University of Montreal collected the tiny plant at Natashkwan (North Shore of the St Lawrence River). Harold St. John, who studied the Flora of this region didn't mention it, in his publication.² It has also been found in Lac Ste. Anne, Co. Gaspé (*Victorin*).

Last summer, whilst botanizing along the Richelieu River, I observed that this aquatic plant was common at several points on the shores of this river, such as Ste Therese Island, near St Jean. Prof. Marie-Victorin found it also on the same river, at the place named "Sabrevois." These stations are on the river which flows from Lake Champlain, whence Pringle had specimens.

The North American area is therefore: Newfoundland, Quebec, New Brunswick,³ Nova Scotia, Ontario, Maine, Vermont, New York, Wisconsin and Minnesota.—MARCEL RAYMOND, College de Saint Jean, Québec, Canada.

ECONOMIC PLANTS.—The story goes that Asa Gray, pestered by the half-intelligent and wholly practical "man on the street" with the question, "Now, what is the value of botany, anyway?", regularly replied "Why, it earns my bread and butter," or words to the same effect. Just at the present epoch the same answer cannot always be truthfully given, but, at least, the wholly impractical student of botany can, if he will, find plenty of practical answers. For instance, refer him to Chapter IX, on Food Products: Cereals and Allied Crops, in Professor Stanford's new book⁴ and to the first page of the chapter: "Foods are either PLANT PRODUCTS OR ANIMAL PRODUCTS; if the latter, they are still products of plant metabolism taken at second or at nth hand." What would the objector to botany do for food without plants and their products? In a brief note like this only the general impression can be recorded. The book is beautifully printed and well illustrated, full of organized matter of general interest, the chapters dealing, among other subjects, with forest products,

¹ RHODORA, May, 1934.

² Victoria Museum. A Botanical Exploration of the North Shore of St. Lawrence, including a list of the Vascular Plants. H. St John.

³ Macoun, Cat. Can. Pl. i. 575.

⁴ ECONOMIC PLANTS by Ernest Elwood Stanford. xxiii + 571 pages, 376 illustrations. D. Appleton-Century Co., New York and London, 1934. (The Century Biological Series) \$4.50

textiles, foods, sugars, oils, nitrogen, fruits, spices, beverages and medicines. It is a striking feature, perhaps a reflection of personal convictions but hardly reflecting scientific thoroughness, that no mention in the table of contents or in the index is found of alcohol, tobacco or *Nicotiana*, although tea, coffee, opium and chewing gum are all entered. The omissions can hardly reflect the author's belief that these are not at least "economic" products. The profits of some of the tobacco companies and of the wine industry in his own state of California are sufficient to merit consideration of their sources in a well rounded book. Barring such omissions, the book is full of practical, and some theoretical, information. If all who wish to understand some of the practical values of botany will buy and read it, they will help still another botanist to his "bread and butter."—M. L. F.

A RANGE EXTENSION OF *DRABA RUAXES*.—Among the plants collected by Robert H. Bates on the Bradford Washburn Mt. Crillon Expedition in 1933 was an arctic-alpine *Draba* which Professor M. L. Fernald has identified as *Draba ruaxes* Payson & St. John. This plant which was only recently (1930) described from Glacier Peak, Snohomish Co., Washington,¹ has been found elsewhere only at high altitudes (8000–9000 ft.) in western British Columbia.² On Mt. Crillon, which is south of Mt. Fayerweather in southern Alaska, *Draba ruaxes* grew on an exposed ridge at 5800 ft. which, according to the Washburn party, was the upper limit of vascular plants. This station of *Draba ruaxes* on Mt. Crillon represents a range extension north of between 450 and 500 miles. Further exploration of Alaskan mountains may well show that this *Draba* occurs even farther north.—W. B. DREW, Gray Herbarium.

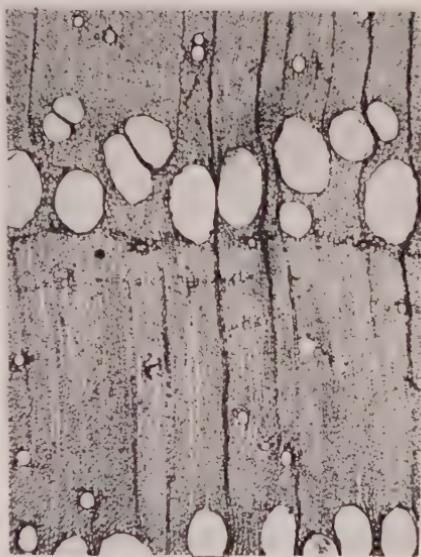
¹ Payson, E. B. and St. John, H., *The Washington Species of Draba*. Proc. Biol. Soc. Wash. xliii. 117–119 (1930).

² I am indebted to the Provincial Museum of Natural History at Victoria, B. C. for specific information concerning the exact stations for *Draba ruaxes* in British Columbia. This *Draba* was collected by Mr. & Mrs. D. Munday in 1928 in the Mt. Waddington Region (125° 22' long.; 51° 15' lat.). (See Report, Prov. Mus. Nat. Hist. (Brit. Col.) 14–16 (1928)).

Volume 36, no. 432, including pages 409 to 446, plate 322 and title-page of the volume, was issued 8 December, 1934.



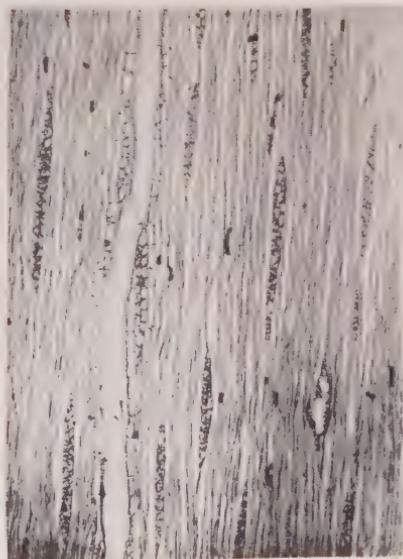
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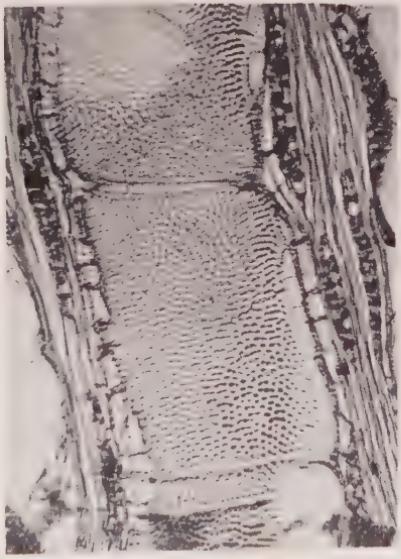
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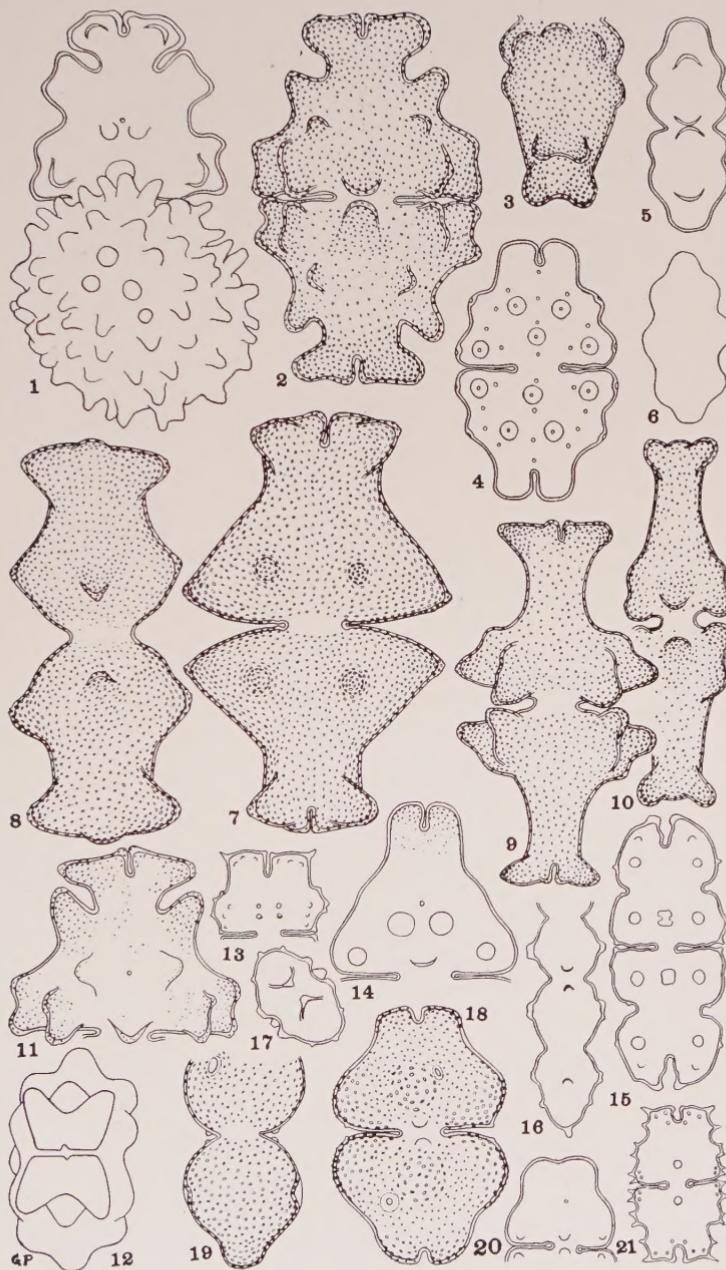


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Sections of Post-Wisconsin FRAXINUS NIGRA.



New England Species of EUASTRUM.

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